

Logix 1000 Positioner

Introduction:

The Logix 1000 positioner provides highly accurate positioning and very responsive control of quarter turn valves and dampers. Configured using the Hart protocol and a PC or handheld configurator, the Logix features advanced dynamic tuning, custom valve characterization and predictive/preventative maintenance routines.



Applications:

A fast, 16-bit microprocessor and unique two-stage electronic relay make the Logix suitable for use in precise pneumatic actuator control applications including: Rack-and-Pinion, Heavy Duty, Vane and others.

The Logix may be installed on any actuator conforming to the NAMUR standard for accessory mounting bolt pattern and pinion height without a coupler. The Logix spring-loaded shaft takes up all deadband for highly accurate control.

The Logix housing is constructed from durable cast aluminum and treated with an anodized undercoat and powder topcoat coat for protection against the toughest applications in all process industries including:

1. Chemical and Petro-chemical
2. Power
3. Food and Beverage
4. Pharmaceutical
5. Municipal
6. Wastewater Treatment

Flowserve Corporation
Flow Control Division
www.flowserve.com

1350 N. Mountain Springs Parkway
Springville, Utah 84663-3004
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Features:

1. **Quick-Cal™** function provides fast, push-button automatic calibration of valve open and closed position.
2. **Two-Stage Electronic Relay** facilitates quick, accurate response to both large and small signal changes.
3. **Enhanced Data-Packing Technique.** Using an enhanced data-packing technique and Valtalk™ software, data transfer with the Logix Series 1000 positioner is many times faster than current HART-compatible systems, resulting in a dramatic speed increase in configuration and diagnostic signature acquisition.
4. A fast **Sixteen-bit Processor** provides a substantial increase in CPU speed, allowing greater on-board diagnostics capability.
5. **Low Operating Current.** The Logix operates when the current drops as low as 2.8 mA.
6. **Valtalk Software** allows the operator to run diagnostics and signatures, calibrate, display parameters, log data, set alarms and perform many other functions in a familiar Windows environment with on-line help files.
7. **Twenty-one Point Custom Characterization** allows the valve to be in virtually any position the operator desires for a given signal.
8. **Local Status LEDs** provide operators with a window into the system, alerting personnel to potential problems. This results in improved plant safety and less down time. The green LED indicates that the positioner and all alerts are normal. Yellow indicates a user limit or alert has been reached. Red indicates that a positioner failure has occurred.
9. **Hazardous Area Certification.** The Logix Series 1000 digital positioner carries both explosion-proof and intrinsically safe approvals.

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Materials of Construction:

Housing: Cast, powder-painted aluminum.
Shaft: Stainless Steel

Valtalk Software Requirements:

Minimum 80486 processor, Windows 95 or NT, 16-MB total memory (32 MB recommended), 20 MB available hard disk space, and one 3.5-inch floppy drive.

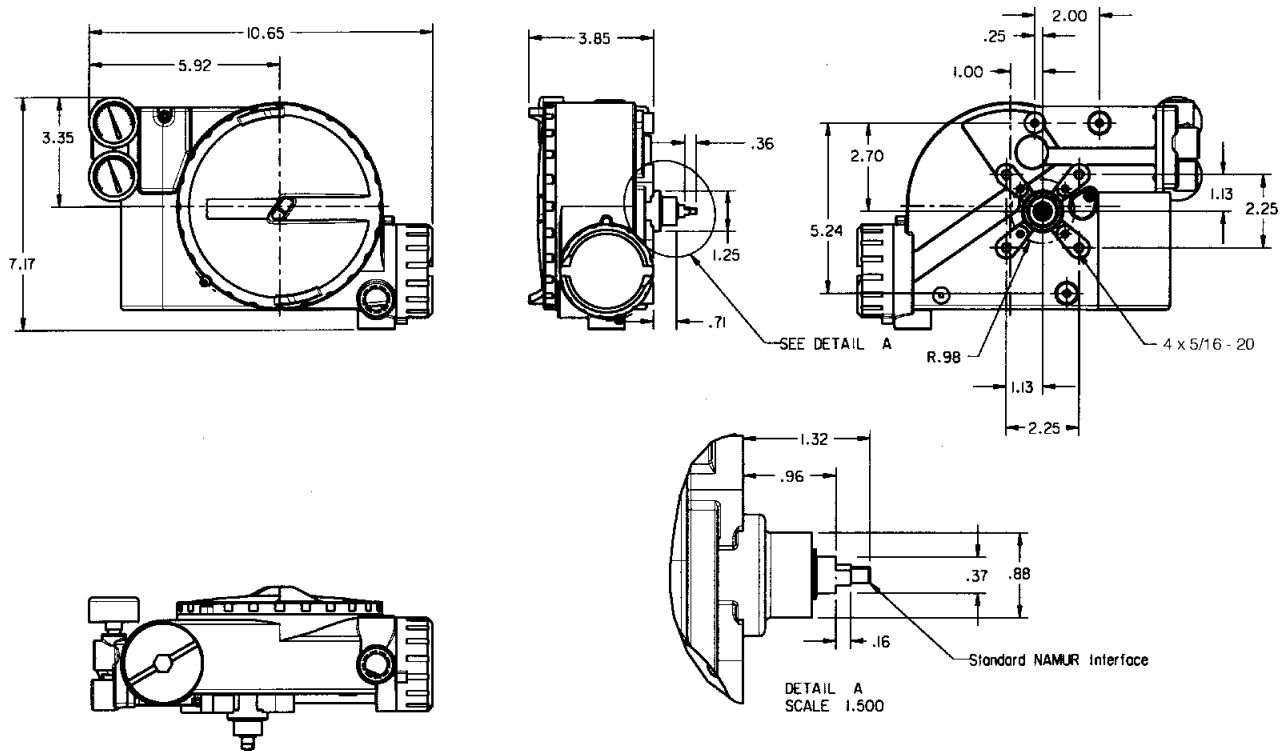
Certification / Listings:

Explosion-proof:
Class I, Division 1, Groups B-D
Class II, Division 1
Intrinsically safe:
Class I, II, Division 1
(Certifications pending)

Specifications:

Power supply	Two-wire, 4-20 mA input
Compliance voltage	12 VDC
Effective resistance	600 ohm @ 20 mA
Communications	HART Protocol
Minimum required Start-up current	3.2 mA
Minimum operating current	2.8 mA
Response Level	0.1% full scale
Deadband	<0.1% full scale
Linearity	<0.5%
Repeatability	<0.05% full scale
Hysteresis	Max 0.2% full scale
Air consumption at 60 psig	<0.3 SCFM
Operating Temperature Range	-40°C to +85°C (-40°F to +185°F)
Weight	8.5 pounds (3.9 kg)

Dimensions:



Positioner Operation

The Logix 1000 positioner is an electric feedback instrument. The diagram below shows a Logix 1000 positioner installed on a double-acting actuator. Positioning is based on a balance of two signals: one proportional to the command input signal and the other proportional to the valve stem position.

The supply pressure for the positioner pressure modulator is tapped off the main supply and is filtered by a field-replaceable element. Next it passes through an internal pressure regulator that regulates it to approximately 22 psig. The air then passes through an orifice that restricts the flow and air consumption.

The pressure modulator further controls the air to 6-12 psig, using a spring-diaphragm flapper that is attracted by an electromagnet to a nozzle. A temperature compensated Hall effect sensor mounted on a circuit board senses the spool valve position. The Hall effect sensor and circuitry create an inner feedback loop, which determines how much current to send to the electromagnet for a desired spool valve position. The electromagnet in the feedback loop varies the nozzle-flapper spacing, which regulates the output pressure to 6-12 psig, proportional to the digital position algorithm.

When the command and stem position signals are equal, the system will be in equilibrium and the valve stem will be in the position called for by the command signal. If these opposing signals are not equal, the spool valve will move up (or down) and, by means of the pressure modulator, change the output pressures and flow rate. This will cause the actuator pistons to move until the signal of the position sensor equalizes with the command signal.

Detailed Sequence of Positioner Operations

The detailed sequence of positioner operations is as follows: An increase in the command signal causes the modulator pressure to increase, pushing the spool assembly from its equilibrium position. This opens the spool valve ports, supplying air to Output 1 and exhausting air from Output 2. This causes the actuator pistons to move. The motion of the pistons is transmitted back to the positioner through the stem position feedback linkage, changing proportionally to the valve stem position. The pistons continue to stroke until the stem position signal of the sensor increases sufficiently to counter the signal being sent to the control algorithm. At this point, the spool is at its equilibrium position as the pressures in the cylinder stabilize and the airflow to the actuator decreases. The computer will then make small null adjustments to fine-tune the desired position and compensate for changes in dynamic loading. A decrease in the command signal reverses the described actions.

